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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/577,502	05/24/2000	Lauri Stahle	PM 270705 T297071US/Br/ht	6402
909	7590	11/18/2004	EXAMINER RYMAN, DANIEL J	
PILLSBURY WINTHROP, LLP P.O. BOX 10500 MCLEAN, VA 22102			ART UNIT 2665	PAPER NUMBER

DATE MAILED: 11/18/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 09/577,502	<b>Applicant(s)</b> STAHLE ET AL.	
	<b>Examiner</b> Daniel J. Ryman	<b>Art Unit</b> 2665	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 03 September 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,3-5,8-10,12-14,17 and 18 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3-5,8-10,12-14,17 and 18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date: _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                    | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date: _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Response to Arguments***

1. Applicant's arguments with respect to claims 1, 3-5, 8-10, 12-14, 17, and 18 have been considered but are moot in view of the new ground(s) of rejection.

### ***Claim Objections***

2. Claim 13 is objected to because of the following informalities: in line 13 "each rake branch by a beam former" should be "each rake branch by a first beam former of a plurality of beam formers included in each branch". Claim 13 the limitation "the beam formers. . . inside each rake branch," in lines 28-29, and the limitation "a first beam former," in line 32. These limitations imply that there are multiple beam formers in each rake branch; however, the limitation of line 13 suggests that there is only one per branch. The claim would be clearer if the limitation in line 13 was changed to "each rake branch by a first beam former of a plurality of beam formers included in each branch" and the limitation in line 32 was changed to "the first beam former." Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 3-5, 13, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Antonio et al (USPN 5,621,752) in view of Bierly et al. (USPN 6,370,182) in further view of Popovic et al (USPN 6,370,397).

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5. Regarding claims 1 and 13, Antonio discloses a receiver for receiving a signal of a desired user, which signal may arrive at the receiver in different components along several different paths at several different delays (Fig. 2 and col. 4, lines 22-35), the receiver comprising: an antenna array composed of more than one element for receiving the signal (col. 3, lines 59-col. 4, line 50 and col. 6, lines 26-33), wherein the received signal comprises I- and Q- branches (col. 6, lines 6-8), one or more rake branches for demodulating the received signal (Fig. 8; col. 4, lines 36-61; col. 8, lines 3-19; and col. 13, lines 37-43), at least one search branch adapted to search for incoming directions and delays of components of the received signal (col. 3, line 59-col. 4, line 7; col. 7, lines 8-37; col. 7, line 46-col. 9, line 5; and col. 10, line 15-col. 11, line 25), and to transmit information indicating a most favorable signal component demodulated by the one or more rake branches (col. 8, line 32-col. 9, line 5), and in which the receiver includes a plurality of beam formers including a first beam former (col. 6, lines 48-col. 7, line 37; col. 7, lines 48-66; and col. 10, line 15-col. 11, line 25), a plurality of correlators including a first correlator and being respectively coupled to the outputs of the beam formers (col. 4, lines 4-7; col. 4, lines 54-57; col. 7, lines 48-66; col. 8, line 3-col. 9, line 5; and col. 10, line 15-col. 11, line 25), and a demodulator coupled to the outputs of the plurality of correlators (col. 2, line 55-col. 3, line 5; col. 4, lines 36-61; col. 8, lines 3-19; and col. 10, line 15-col. 11, line 25), a code generator for generating the codes required by the plurality of correlators (col. 3, line 59-col. 4, line 7 and col. 4, lines 51-61).

Antonio does not expressly disclose that each rake branch includes a plurality of beam formers since Antonio discloses that the beam formers are located before the rake branch. Bierly teaches, in a wireless communication system, including beam formers within a rake branch in

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order to allow the beam formers and demodulator to use the same circuitry for efficiency purposes (col. 12, line 61-col. 13, line 4). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to include beam formers within a rake branch in order to allow the beam formers and demodulator use the same circuitry for efficiency purposes.

Antonio in view of Bierly does not expressly disclose that the each rake branch contains control means; however, Antonio in view of Bierly does disclose control means adapted to control the operation of the code generator and the plurality of beam formers via at least one control signal (Antonio: col. 3, line 59-col. 4, line 7; col. 8, line 32-col. 9, line 5; and col. 10, line 15-col. 11, line 25), by which control means, information is received from the search branch about the incoming direction and delay of the most favorable signal component (Antonio: col. 3, line 59-col. 4, line 7; col. 8, line 32-col. 9, line 5; and col. 10, line 15-col. 11, line 25), and calculation means whose inputs include the outputs of the plurality of correlators, the calculation means being adapted to calculate and transmit to the control means, on the basis of the outputs of the plurality of correlators, information on how the code generator and the plurality of beam formers are to be controlled to ensure that the first beam former and the first correlator receive the most favorable signal component via the direction and delay calculated for this purpose (Antonio: col. 3, line 59-col. 4, line 7; col. 8, line 32-col. 9, line 5; and col. 10, line 15-col. 11, line 25), wherein the plurality of correlators included in the at least one rake branch are adapted to calculate, for only one branch of the received signal (Antonio: Fig. 12 and col. 14, lines 36-49), a correlation from a calculated incoming direction and from left and right sides of that incoming direction of that at least one rake branch (Antonio: col. 3, line 59-col. 4, line 7; col. 8, line 32-col. 9, line 5; and col. 10, line 15-col. 11, line 25), and wherein the calculation means are

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adapted to calculate a control signal for controlling the beam formers such that, if the correlation result calculated, for the only one branch of the received signal (Antonio: Fig. 12 and col. 14, lines 36-49), from the left or right side of the incoming direction is higher than the correlation result obtained from the calculated incoming direction, for the only one branch of the received signal, the first beam former is controller to receive the signal from the left or right side of the incoming direction having the higher correlation result (Antonio: Fig. 12; col. 3, line 59-col. 4, line 7; col. 8, line 32-col. 9, line 5; col. 10, line 15-col. 11, line 25; and col. 14, lines 36-49).

Examiner takes official notice that distributed control means are well known in the art since distributing the control functions eliminates the need for an expensive central controller. It would have been obvious to one of ordinary skill in the art at the time of the invention to have each rake branch contain control means since distributing the control functions eliminates the need for an expensive central controller.

Antonio in view of Bierly does not expressly disclose that the two-dimensional impulse response of the received signal is calculated by searching for the incoming directions and delays of the received signal components. Popovic teaches, in a system for receiving a multipath signal, "if an ideal pulse is transmitted over a multipath channel, the received corresponding signal appears as a stream of pulses, each pulse or path having a corresponding different time delay, as well as different amplitude and phase. Such a complex received signal is usually called the channel impulse response" (col. 1, lines 36-49). It would have been obvious to one of ordinary skill in the art at the time of the invention to calculate the two-dimensional impulse response of the received signal by searching for the incoming directions and delays of the received signal

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components since the impulse response is defined as the incoming directions and delays of the received signal components.

6. Regarding claims 3 and 14, referring to claims 1 and 13, Antonio in view of Bierly in further view of Popovic discloses controlling the code generator and the beam formers such that the correlation value indicated by the output signal of the correlator to which the signal received from the desired direction has been applied is as high as possible (Antonio: Fig. 5d; col. 3, line 59-col. 4, line 7; col. 8, line 32-col. 9, line 5; and col. 10, line 15-col. 11, line 25).

7. Regarding claim 4, referring to claim 1, Antonio in view of Bierly in further view of Popovic discloses a calculation means adapted to calculate for the code generator a phase change and for the beam formers an angular change, such that the correlation value indicated by the output signal of the first correlator is as high as possible (Antonio: Fig. 5d; col. 3, line 59-col. 4, line 7; col. 8, line 32-col. 9, line 5; and col. 10, line 15-col. 11, line 25).

8. Regarding claim 5, referring to claim 1, Antonio in view of Bierly in further view of Popovic suggests a calculation means adapted to calculate control information for the code generator and the beam formers at predetermined intervals (Antonio: Fig. 5d; col. 3, line 59-col. 4, line 7; col. 8, line 32-col. 9, line 5; and col. 10, line 15-col. 11, line 25).

9. Claims 8, 9, 12, 17, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Antonio et al (USPN 5,621,752) in view of Bierly et al. (USPN 6,370,182) in further view of Popovic et al (USPN 6,370,397) as applied to claims 1 and 13 above, and further in view of El-Tarhuni et al (USPN 6,201,828).

10. Regarding claim 8 and 17, referring to claims 1 and 13, Antonio in view of Bierly in further view of Popovic does not expressly disclose calculating the correlation before and after

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the calculated delay of the most favorable signal component. El-Tarhuni teaches, in a system for receiving a multipath signal of a desired user, calculating the correlation before and after the calculated delay of the most favorable signal component in order to track transmission delay at low cost and with low complexity (Fig. 3; col. 2, lines 36-45; col. 2, lines 48-62; and col. 3, lines 20-62). It would have been obvious to one of ordinary skill in the art at the time of the invention to calculate the correlation before and after the calculated delay of the most favorable signal component in order to track transmission delay at low cost and with low complexity.

11. Regarding claims 9 and 18, referring to claims 8 and 17, Antonio in view of Bierly in further view of Popovic discloses that the code generator is so controlled that if the correlation result calculated before or after the calculated delay of the most favorable signal component is higher than the correlation result obtained from the calculated delay, the code generator is operative to shift code phase to a phase before or after the calculated delay (Antonio: Fig. 5d; col. 3, line 59-col. 4, line 7; col. 8, line 32-col. 9, line 5; and col. 10, line 15-col. 11, line 25 and El-Tarhuni: Fig. 3; col. 2, lines 36-45; col. 2, lines 48-62; and col. 3, lines 20-62).

12. Regarding claim 12, referring to claim 1, Antonio in view of Bierly in further view of Popovic does not expressly disclose that the code generator generates the following codes having different phases: on-time I, on-time Q, late I, early Q. El-Tarhuni teaches, in a system for receiving a multipath signal of a desired user, having a code generator that generates the following codes having different phases: on-time I, on-time Q, late I, early Q in order to track transmission delay at low cost and with low complexity (Fig. 3; col. 2, lines 36-45; col. 2, lines 48-62; col. 3, lines 20-62; and col. 5, lines 1-9). It would have been obvious to one of ordinary skill in the art at the time of the invention to have a code generator that generates the following



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codes having different phases: on-time I, on-time Q, late I, early Q in order to track transmission delay at low cost and with low complexity.

13. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Antonio et al (USPN 5,621,752) in view of Bierly et al. (USPN 6,370,182) in further view of Popovic et al (USPN 6,370,397) as applied to claim 1 above, and further in view of Lomp et al (USPN 6,272,168).

14. Regarding claim 10, referring to claim 1, Antonio in view of Bierly in further view of Popovic discloses that, for each branch of the rake receiver, the noise level is calculated in the incoming direction of the desired signal component in order to determine SNR (col. 10, lines 31-67) where it is implicit that calculating SNR requires knowledge of the noise level. Antonio in view of Bierly in further view of Popovic does not expressly disclose that the at least one rake branch includes a noise code generator and a plurality of correlators which are coupled to the outputs of the beam formers wherein inputs of the respective correlators are coupled to the output of the noise code generator, the at least one rake branch further including a demodulator coupled to the respective outputs of the correlators, the demodulator being adapted to calculate noise level from the calculated incoming direction of the most favorable signal component.

Lomp teaches, in a CDMA system, that a noise level can be determined by a noise code generator and a number of correlators (col. 21, lines 9-18) where it is implicit that the noise level can be calculated with equipment already present in the receiver. It would have been obvious to one of ordinary skill in the art at the time of the invention to have the at least one rake branch include a noise code generator and a plurality of correlators which are coupled to the outputs of the beam formers wherein inputs of the respective correlators are coupled to the output of the

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noise code generator, the at least one rake branch further including a demodulator coupled to the respective outputs of the correlators, the demodulator being adapted to calculate noise level from the calculated incoming direction of the most favorable signal component in order to calculate the noise level for the incoming signal using only equipment already present in the receiver for the purpose of finding the signal with the highest SNR.

### *Conclusion*

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Martin et al (USPN 6,324,160) see entire document which pertains to an adaptive receiver. Chang et al (USPN 6,320,899) see entire document which pertains to a two-dimensional demodulator in CDMA system.

16. If a copy of a provisional application listed on the bottom portion of the accompanying Notice of References Cited (PTO-892) form is not included with this Office action and the PTO-892 has been annotated to indicate that the copy was not readily available, it is because the copy could not be readily obtained when the Office action was mailed. Should applicant desire a copy of such a provisional application, applicant should promptly request the copy from the Office of Public Records (OPR) in accordance with 37 CFR 1.14(a)(1)(iv), paying the required fee under 37 CFR 1.19(b)(1). If a copy is ordered from OPR, the shortened statutory period for reply to this Office action will not be reset under MPEP § 710.06 unless applicant can demonstrate a substantial delay by the Office in fulfilling the order for the copy of the provisional application. Where the applicant has been notified on the PTO-892 that a copy of the provisional application is not readily available, the provision of MPEP § 707.05(a) that a copy of the cited reference will be automatically furnished without charge does not apply.


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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniel J. Ryman whose telephone number is (571)272-3152. The examiner can normally be reached on Mon.-Fri. 7:00-4:30 with every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Huy Vu can be reached on (571)272-3155. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DJR  
Daniel J. Ryman  
Examiner  
Art Unit 2665

  
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